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The Honorable Christine Todd Whitman
Administrator
U.S. Environmental Protection Agency
Ariel Rios Building
Room 3000, #1101-A
1200 Pennsylvania Ave., N.W.
Washington, DC 20460

Subject: Comments on the Mercaptans/Thiols Council's HPV Test Plan for Methyl Mercaptan and Methyl Mercaptide

Dear Administrator Whitman:

The following comments on the Mercaptans/Thiols Council (MTC) test plan for methyl mercaptan and methyl mercaptide are submitted on behalf of the Physicians Committee for Responsible Medicine, People for the Ethical Treatment of Animals, the Humane Society of the United States, the Doris Day Animal League, and Earth Island Institute. These health, animal protection, and environmental organizations have a combined membership of more than nine million Americans.

The MTC has grouped together methyl mercaptan and methyl mercaptide, as they are considered analogs according to EPA guidance. Methyl mercaptide is the salt of methyl mercaptan. These two chemicals exist in equilibrium at pH-dependent ratios. In living organisms, methyl mercaptide will be converted to methyl mercaptan.

The MTC has conducted a literature review and has presented data to address each of the physical/chemical and health endpoints included in the HPV program. The MTC has also drawn on the extensive available data on hydrogen sulfide to fill datagaps. However, the MTC has proposed performing an acute fish toxicity test with methyl mercaptide to fulfill the ecotoxicity endpoint. This test will kill approximately 60 animals.

Extensive human and animal data on hydrogen sulfide and methyl mercaptan are available. Methyl mercaptan is used as a gas odorant, catalyst, intermediate in manufacturing jet fuels, and in the production of certain chemicals, including pesticides and fungicides. Abundant information shows that this dangerous gas exhibits similar effects to hydrogen sulfide. The MTC presents a defensible case for using hydrogen sulfide data as an upper-bound estimate of the potential reproductive and developmental hazards associated with methyl mercaptan. We commend the Council's judicious use of the available information on hydrogen sulfide.

Methyl mercaptan is acutely toxic and can produce muscular weakness, tremors, unconsciousness, and death by respiratory paralysis. At lower concentrations, methyl mercaptan can cause pulmonary edema. Less severe effects associated with exposure to methyl mercaptan include eye and mucous membrane irritation, as well as effects on the central nervous system, such as headache, dizziness, nausea, and vomiting.

Reproductive and Developmental Toxicity

Some existing studies on the potential reproductive and developmental hazards associated with hydrogen sulfide were not presented by the MTC and are therefore described here. This provides further support for the contention that no further screening-level testing should be conducted to characterize these chemicals. A study of spontaneous abortions in an industrial community in Finland concluded that more spontaneous abortions were observed in women employed in textile and paper industry jobs in areas where the mean annual level of hydrogen sulfide exceeded 4 mg/m^3. This effect was observed across all socioeconomic classes but was not statistically significant.[1]

It has long been postulated that hydrogen sulfide can inhibit critical developmental functions through the cleavage of disulfide bonds and chelation of essential metal ions. Many animals have already been killed to test the reproductive and developmental effects of hydrogen sulfide. Further screening level studies on these chemicals are inappropriate.[2-5]

Acute Fish Toxicity

It is has been documented for than 50 years that methyl mercaptan is toxic to fish. In its test plan and robust summaries, the MTC has presented studies indicating that methyl mercaptan and methyl mercaptide present aquatic hazards.

In addition, fish used for human consumption may already be exposed to sulfide and hydrogen sulfide during fish farming operations. A fish toxicity study reported that exposure of channel catfish to 0.5 mg/l hydrogen sulfide at 20 degrees Celsius resulted in hyperpnea, apnea, and respiratory arrest. Catfish brain cytochrome oxidase activity was inhibited in exposed fish.[6]

Additionally, ecological studies of naturally occurring recurrent eruptions of toxic hydrogen sulfide gas in waters along the Namibian coast of southwestern Africa have already shown that these eruptions cause hypoxia in aquatic organisms.[7]

Moreover, given the availability of nonanimal methods, any further testing on fish is inappropriate. Ecological epidemiological studies could be conducted in fisheries contaminated with high levels of hydrogen peroxide, or in waters subjected to natural emissions of these toxic gases. In addition, ECOSAR, an established QSAR program that estimates toxicity to fish, invertebrates, and algae, could be used to further explore this endpoint. EPA encourages the use of ECOSAR in its draft guidance document *The Use of Structure-Activity Relationships (SAR) in the High Production Volume Chemicals Challenge Program* (viewable at *http://www.epa.gov/chemrtk/sarfinl1.htm*).

As described in previous comments, *in vitro* tests with the protozoan *Tetrahymena* are frequently used as a measure of aquatic toxicity in ecological risk assessments.[8] The biochemistry and physiology of *Tetrahymena* have been thoroughly investigated since the 1950s, and *Tetrahymena*, especially *T. pyriformis*, have been used for aquatic toxicity testing since the 1970s. Moreover, the genomics of the organism are currently being elucidated. The *T. pyriformis* population growth test is quick, easy, and cheap, and has great breadth.[9] Both the *in vitro* TETRATOX assay as well as QSARs provide more humane, efficient methods to predict aquatic toxicity at the screening level. We have an ongoing dialogue with the EPA about the incorporation of these alternative, nonanimal methods into the HPV program, and we ask that MTC raise this issue with the EPA.

There is sufficient information to show that these chemicals are toxic to aquatic organisms, and no additional animals should be killed to investigate this issue at the screening level that the HPV program represents. Any further research into this area should focus on reducing sources of sulfide chemicals into aquatic environments, not additional testing. The potential ecological hazards of these chemicals have already been described in the literature, and additional animal tests will not help protect the environment.

In conclusion, we support the MTC's contention that no additional mammalian studies should be conducted to characterize the hazards of these dangerous gases. We recommend the acute fish toxicity test be deleted, as the existing information is sufficient to characterize these chemicals and alternative methods are available.

Thank you for the opportunity to comment. I look forward to your response on this important issue. I can be reached at 202-686-2210, ext. 302, or at *ncardello@pcrm.org*. Correspondence can be sent to my attention to PCRM, 5100 Wisconsin Ave., N.W., Suite 400, Washington, DC 20016.

Sincerely,

Nicole Cardello, M.H.S.

References

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